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IMAGES IN INTERVENTION

Thoracoscopic Atriclip Closure of Left Atrial Appendage After Failed Ligation via LARIAT

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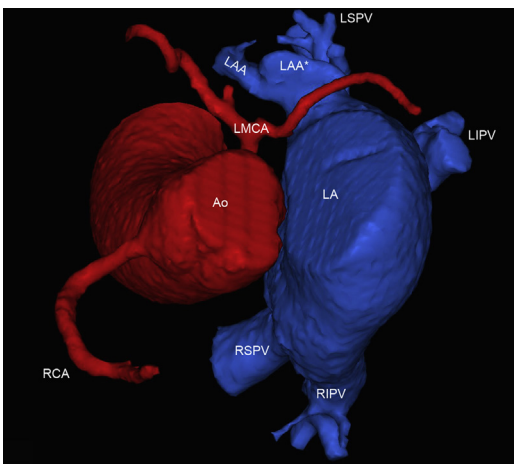
A 68-year-old man with atrial fibrillation was evaluated for ligation of the left atrial appendage (LAA) via the LARIAT Suture Delivery Device (SentreHEART, Redwood City, California). The CHA2DS2-VASc score was 4 for hypertension, cerebrovascular accident, and age. He was intolerant of anticoagulation due to recurrent gastrointestinal hemorrhage. Imaging revealed an anteriorly directed LAA of chicken wing morphology, with a secondary lobe near the ostium (**Figure 1**, Online Video 1).

He underwent LAA ligation using the LARIAT Suture Delivery Device via a standard transseptal and subxiphoid pericardial approach while under general endotracheal anesthesia. The delivery device was cinched over the neck of the LAA, and closure of the LAA ostium was noted (**Figure 2**). After tightening the LARIAT, contrast angiography demonstrated reopening of the LAA proximal lobe. A second LARIAT Plus ligature was used to resnare the neck of the LAA, but reopening of the LAA was again seen (**Figure 2**).

The patient was referred for surgical closure of the LAA with the Atriclip (AtriCure, West Chester Township, Ohio). Thoracoscopic access was obtained to the left chest under general endotracheal anesthesia, and the pericardium was opened posteriorly to the phrenic nerve. The 2 previously deployed LARIAT ligatures were seen, as was early necrosis of the main LAA lobe (**Figure 3**, Online Video 2). The secondary lobe of the LAA was unaffected by these ligatures. A 40-mm Atriclip Pro was deployed at the base of the LAA, achieving complete occlusion (**Figure 3**, Online Video 3). The patient

FIGURE 1 3D Reconstruction of Gated Cardiac Computed Tomography Angiography Pre-Procedure



Aortic root (Ao) in **red**. Left atrium (LA) in **blue**. LAA*, basal secondary lobe of the left atrial appendage. Also see Online Video 1. LAA = left atrial appendage; LIPV = left inferior pulmonary vein; LMCA = left main coronary artery; LSPV = left superior pulmonary vein; RCA = right coronary artery; RIPV = right inferior pulmonary vein; RSPV = right superior pulmonary vein.

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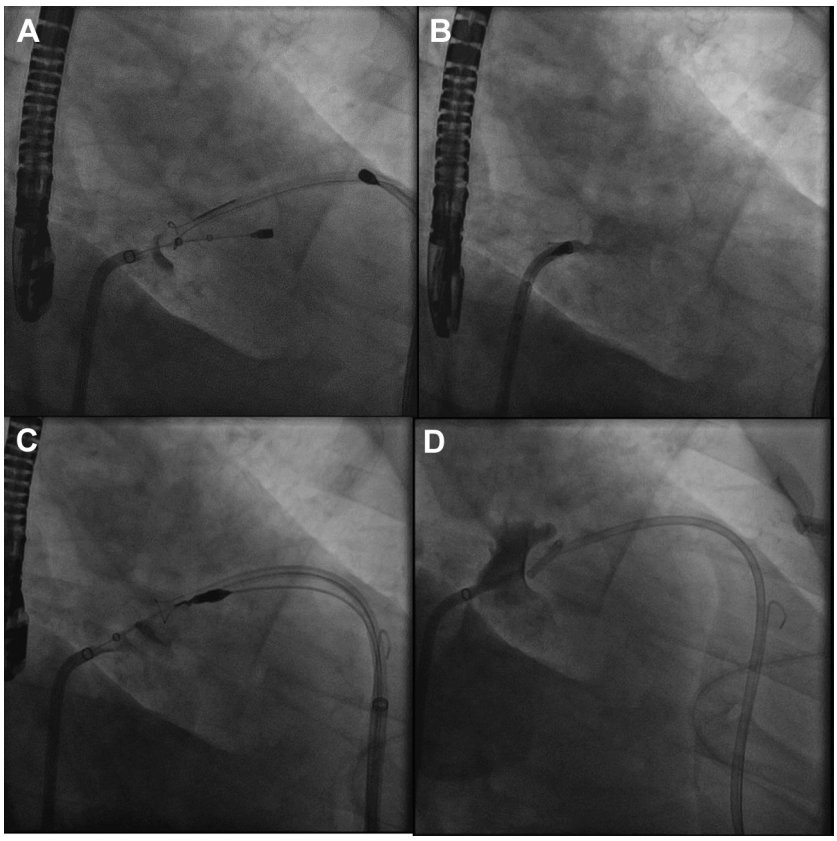
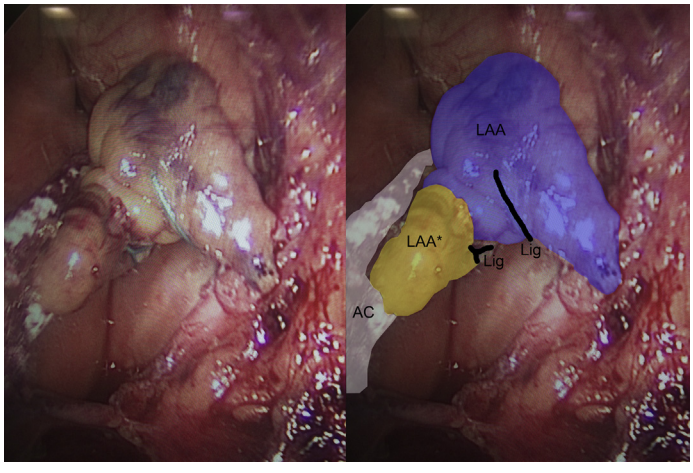
FIGURE 2 LARIAT Suture Delivery Device Deployment



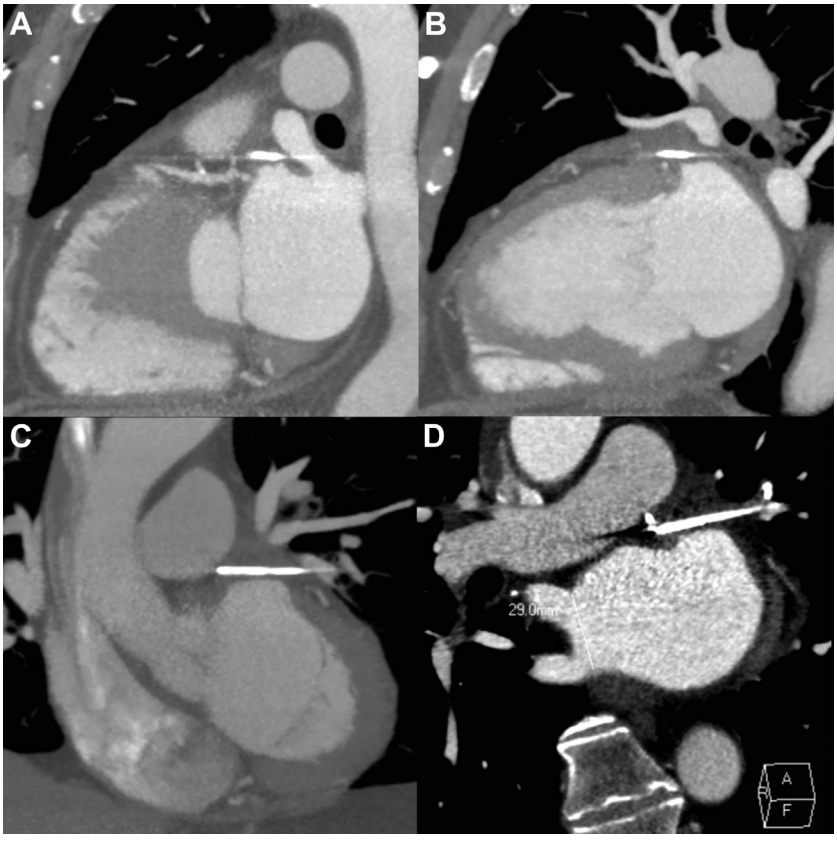
Intraprocedural fluoroscopy during initial deployment of the LARIAT over the neck of the left atrial appendage (LAA) **(A)**, with incomplete closure on post-ligation angiogram **(B)**. **(C)** LARIAT Plus deployment, again over the neck of the LAA. **(D)** Final angiographic appearance of the LAA, with the trabeculated secondary lobe unaffected by LARIAT Plus ligature.

FIGURE 3 Atriclip Deployment



Thoracoscopic appearance of the Atriclip device (AC) **(in white)** over the previously ligated left atrial appendage (LAA) **(in blue)** as well as the previously unaffected secondary lobe (LAA*) **(in yellow)**. Previously deployed LARIAT ligatures are also seen (Lig) **(in black)**. Also see Online Videos 2 and 3.

FIGURE 4 Gated Cardiac CT Angiography After Atriclip Pro Placement



Complete left atrial appendage closure is seen in sagittal **(A,B)**, coronal **(C)**, and oblique **(D)** reconstruction views. CT = computed tomography.

had an uneventful postoperative course. Follow-up with gated cardiac computed tomography angiography showed closure of the LAA (Figure 4).

Epicardial LAA closure is an evolving option for the prevention of stroke in patients with atrial fibrillation. This case demonstrates the feasibility of completion of LAA closure after incomplete LAA ligation via a subxiphoid approach. Additionally, this case highlights the possibility of incomplete LAA closure despite a favorable appearance on angiography during deployment of the LARIAT Suture Delivery Device.

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APPENDIX For supplemental videos, please see the online version of this article.